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Technical appendix

Methodology appendix - Teacher Labour Market in England: Annual Report 2021

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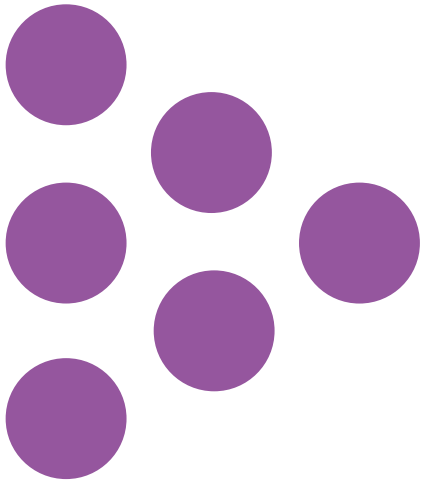

Methodology Appendix – Teacher Labour Market in England: Annual Report 2021

Jack Worth and Henry Faulkner-Ellis

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The Mere, Upton Park, Slough, Berkshire SL1 2DQ

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Contents

1 Introduction

This methodology appendix explains the data we use to inform our analysis of the teacher labour market in England.

- Section 2 describes the data sources that we used, including the two household survey datasets – the Labour Force Survey (LFS) and the UK Household Longitudinal Study (UKHLS) – that we use to measure teachers' (and similar professionals') well-being, pay and working conditions.
- Section 3 describes the methodology for the senior leader survey and presents information about its representativeness.
- Section 4 explains our methodology for identifying teachers in these two household survey datasets.
- Section 5 explains our methodology for identifying groups of similar professionals, by matching their characteristics to the samples of teachers.
- Section 6 explains some details of the analysis we undertake on teacher well-being and working conditions and shows the underlying sample sizes.
- Section 7 describes the different measures we use to describe teachers' (and similar professionals') well-being and working conditions.

2 Data Sources

The following data sources were used to inform this research report:

- Initial Teacher Training: Trainee Number Census. Available: https://www.gov.uk/government/collections/statistics-teacher-training
- School Workforce in England. Available: https://www.gov.uk/government/collections/statistics-school-workforce
- Attendance in Education and Early Years Settings during the Coronavirus (COVID-19) Available: https://explore-education-statistics.service.gov.uk/find-statistics/attendance-in-education-and-early-years-settings-during-the-coronavirus-covid-19-outbreak
- LFS / Annual Population Survey (APS). Available from UK Data Service. More information: https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/methodologies/labourforcesurveyuserguidance
- UK Household Longitudinal Study (Understanding Society) Waves 1-10 and Covid-19 surveys. Available from UK Data Service. More information: https://www.understandingsociety.ac.uk/
- NFER senior leader survey on teacher recruitment and retention Oct-Dec 2020. See section 3.

3 NFER senior leader survey – Oct-Dec 2020

NFER conducted a national survey of senior leaders in primary and secondary state schools in England in autumn term 2020. The findings from the survey aims to gain an understanding of teacher recruitment and retention, with a particular focus on how the experience of recruiting and retaining teachers has been affected by the Covid-19 pandemic. The survey themes include:

- the extent of teacher shortages as reported by schools
- how satisfied schools were with the quality of applicants and appointees
- strategies to mitigate the impact of unfilled vacancies on pupils and other teachers
- barriers that teacher shortages have imposed upon the school meeting any achievements
- contextual challenges schools face in terms of recruitment and retention
- the impact that Covid-19 has had on teacher recruitment, retention and deployment.

We received responses from 520 senior leaders in primary schools and 343 senior leaders in secondary schools. The responses were drawn from different categories of school, but the proportions of each school characteristic did not identically match the population. Notable differences between the characteristics of the response sample and the population of all schools, were in school type and FSM quintile (for secondary only).

We weighted the survey responses to be representative of the population of state schools in England, according to factors that may be associated with a school's general context and specifically its teacher recruitment and retention situation. We weighted the responses by:

- school type
- quintile of proportion of pupils eligible for free school meals any time in the previous six years
- achieving excellence area category – a local-area measure of educational attainment and capacity to improve (see here for more details)
- whether the school reported at least one open vacancy or temporarily-filled post in the 2019 School Workforce Census
- Ofsted rating
- Category of geographical area (London/ large urban/ medium-sized urban/ small non-coastal, small coastal) (see here for more details)

The weighting was performed using entropy balancing (Hainmueller, 2012). The representativeness of the primary and secondary samples – both before and after weighting – are shown, respectively, in Tables 1 and 2.

Table 1 Representativeness of primary senior leader sample

School characteristic		Population	Sample		
		%	N	Unweighted %	Weighted %
School type	LA Maintained	64	362	70	64
	Single-academy trust	4	27	5	4
	Multi-academy trust	33	131	25	33
Quintile of pupil FSM	Lowest 20%	19	97	19	19
	Middle-lowest 20%	20	99	19	20
	Middle 20%	19	106	20	19
	Middle-highest 20%	19	102	20	19
	Highest 20%	19	106	20	19
	Missing FSM data	3	10	2	3
Achieving Excellence Area Category	Category 1	14	74	14	14
	Category 2	15	70	13	15
	Category 3	17	98	19	17
	Category 4	20	99	19	20
	Category 5	17	97	19	17
	Category 6	17	82	16	17
School had a vacancy or temporarily-filled post	No	93	470	90	93
	Yes	6	33	6	6
	Missing data	1	17	3	1
Ofsted rating	Outstanding	17	92	18	17
	Good	70	352	68	70
	Requires improvement	9	50	10	9
	Inadequate	2	11	2	2
	Missing/ not inspected	3	15	3	3
Type of geographical area	London	11	55	11	11
	Large cities	30	149	29	30
	Medium-sized cities	27	163	31	27
	Small, non-coastal	19	99	19	19
	Small, coastal	13	54	10	13
Total N = 520					

Note: percentages may not sum to 100% due to rounding.

Table 2 Representativeness of secondary senior leader sample

School characteristic		Population	Sample		
		%	N	Unweighted %	Weighted %
School type	LA Maintained	22	103	30	22
	Single-academy trust	22	94	27	22
	Multi-academy trust	56	146	43	56
Quintile of pupil FSM	Lowest 20%	19	83	24	19
	Middle-lowest 20%	19	78	23	19
	Middle 20%	19	66	19	19
	Middle-highest 20%	19	65	19	19
	Highest 20%	19	37	11	19
	Missing FSM data	5	14	4	5
Achieving Excellence Area Category	Category 1	17	41	12	17
	Category 2	14	67	20	14
	Category 3	17	68	20	17
	Category 4	19	56	16	19
	Category 5	17	70	20	17
	Category 6	16	41	12	16
School had a vacancy or temporarily-filled post	No	70	246	72	70
	Yes	27	89	26	27
	Missing data	2	8	2	2
Ofsted rating	Outstanding	20	70	20	20
	Good	53	205	60	53
	Requires improvement	15	45	13	15
	Inadequate	5	11	3	5
	Missing/ not inspected	7	12	4	7
Type of geographical area	London	15	37	11	15
	Large cities	32	93	27	32
	Medium-sized cities	26	94	27	26
	Small, non-coastal	16	70	20	16
	Small, coastal	12	49	14	12
Total N = 343					

Note: percentages may not sum to 100% due to rounding.

4 Defining teachers in household survey datasets

In the LFS/APS and UKHLS data, we define our sample of teachers as: teachers employed in England's state-funded primary, secondary and special schools. Specifically we define our sample as:

- Industry (Standard industrial classification) = 'Primary education' or 'General secondary education'
- Occupation (Standard Occupational Classifications) = 'Primary and nursery education teaching professionals' or 'Secondary education teaching professionals' or 'Special needs education teaching professionals' or 'Senior professionals of educational establishments'
- Country of work = 'England'
- Sector = 'Public'.

We specifically *exclude* from our definition the following occupations:

- 'Teaching and Educational Professionals not elsewhere classified', which includes adult education tutors, education consultants and private tutors
- 'Education advisers and school inspectors'
- 'Higher education teaching professionals'
- 'Further education teaching professionals'.

For our analysis of the UKHLS Covid-19 surveys, we adapt our approach slightly. The Covid-19 surveys did not collect data on occupation, industry or sector. However, we use the longitudinal design of the survey to identify a group who were very likely to be teachers when they completed the surveys in 2020. We began by identifying the sample of teachers in the mainstage Wave 10 survey, which was conducted between 2018 and 2020. We then refine the sample to those who responded to each respective Covid-19 survey, and excluded individuals who responded to the survey that they were:

- not in employment (as teachers would have been employed)
- not keyworkers (as teachers have been consistently identified as keyworkers throughout the pandemic)
- not furloughed (as teachers were not eligible to be furloughed).

It remains possible that ex-teachers who moved into a different occupation between wave 10 and completing the UKHLS Covid-19 survey are classed as teachers in our definition, but the proportion is likely to be small. A limitation of the methodology is that it does not identify as teachers those individuals who were *not* teachers in wave 10 or did not complete a wave 10 survey, but *were* teachers when they responded to the UKHLS Covid-19 survey.

5 Methodology for identifying similar professionals

The aim of our analysis of teachers' well-being and working conditions is three-fold. We seek to measure how:

1. teachers' well-being and working conditions have changed over time
2. teachers' well-being and working conditions compare to those in other professions
3. the difference in well-being and working conditions between teachers and other professionals has changed over time.

Comparing teachers to all employees in professional occupations in a meaningful way is challenging because the two groups are likely to differ in a number of important ways. For example, they may be different because people with different characteristics or motivations select to go into different occupations. No comparison of different occupations should therefore be interpreted as the effect of entering that profession, although working conditions, and employees' perceptions of them, can be influenced by entering that occupation rather than another.

We aim to improve the comparability of our analysis as much as we can. Instead of comparing all teachers to all employees in professional occupations, we analyse a group of professionals with similar characteristics to teachers. The group includes professionals from the private and public sector, including scientists, researchers, engineers, IT professionals, health and nursing professionals, lawyers, accountants, statisticians, economists, social workers, librarians, and journalists. We use an identical methodology for our comparisons using the LFS and UKHLS data.

First, we identify all individuals across all years coded as having a professional occupation according to their Standard Occupational Classification (SOC) code. We use the SOC 2010 definition in the LFS. For the UKHLS data, occupations in early waves were only coded with SOC 2000 codes. Occupations coded in SOC 2010 codes were only available in later waves, and only for those who had changed occupation. We therefore amend the SOC 2000 codes to match the definitions used in SOC 2010 as far as possible, for consistency with the LFS. We do this by using a subset of individuals for whom we have occupation according to both codes.

Specifically, we reassign any non-professional occupational group (according to its SOC 2000 definition) to be in our definition of professionals if at least 85 per cent of individuals within that group were defined, according to the SOC 2010 definition, as being a professional. This included 'Information and communications technology managers', 'Quality assurance managers', 'Nurses', 'Midwives', 'Medical radiographers', 'Chiropodists', 'Physiotherapists', 'Occupational therapists', 'Speech and language therapists', 'Journalists, newspaper and periodical editors' and 'Conservation and environmental protection officers'. We remove those employed in the wider education sector, and those employed outside England from the 'professionals' group.

Second, we re-weight the 'other professionals' group to improve comparability in the underlying personal characteristics between the teacher and other professional groups. This ensures that the distribution of gender, age, region and highest qualification is the same among the teachers and the group of 'other professionals'. We use a technique called *entropy balancing*, to re-weight the 'other professionals' group within each wave and derive a 'similar professionals' group (Hainmueller, 2012). This re-weighting approach does not remove all the underlying differences in characteristics and motivations between teachers and 'other professionals'. However, it minimises the risk that any observed differences in working conditions are driven by differences in the distribution of gender, age, region and highest qualification between the two groups.

We also separately derive a set of matched sub-groups for further analysis, using a similar methodology with different sub-groups of teachers. These include a group of professionals matched to all primary teachers, all secondary teachers, all full-time teachers, full-time primary teachers and full-time secondary teachers. The professional sub-groups all have slightly different analysis weights to ensure the group as a whole has similar characteristics to that which it is matching.

We took a similar approach to identifying professionals in the UKHLS Covid-19 as we did for teachers (explained in the previous section). We identified individuals in professional occupations in UKHLS wave 10, and who responded to the UKHLS Covid-19 survey that they were employed. Again, it remains possible that ex-professionals who moved into a different occupation between wave 10 and completing the UKHLS Covid-19 survey are classed as professionals in our definition, but the proportion is likely to be small.

6 Analysis and sample sizes

6.1 LFS/ APS data

We conduct the analysis using an approximation to an academic year, combining the four quarterly datasets from the beginning of July to the end of the following June. We also define a set of sub-divided time periods for analysis of how well-being and working hours has evolved during the Covid-19 pandemic in 2020. We divided the period from September 1st 2020 to 1st November 2021 into four periods:

- 1st September 2020 – 20th March 2020: the period before the UK Covid-19 lockdown began and schools closed to all but keyworker and vulnerable children shortly after
- 21st March 2020 – 15th June 2020: the UK lockdown in which most teachers worked from home, as schools were closed to all but keyworker and vulnerable children
- 16th June 2020 – 31st July 2020: partial school re-opening for some year groups, while many children continued to learn from home, supported remotely by their teachers
- 1st September 2020 – 30th November 2020: schools fully re-opened to all pupils.

We also analyse the data by month in 2020, although the sample sizes are considerably smaller.

We use the cross-sectional analysis weights provided in the data set. This ensures the analysis is representative of UK households, and therefore by extension, of English teachers in the state-sector.

The sample sizes in the LFS/ APS analysis are shown in Table 3. Sample sizes for each individual measure will differ, depending on the extent of missing data for each measure and the sample used for analysis (e.g. full-time only will have a smaller sample size). The sample sizes of both teachers and other professionals have generally been falling slightly over time, which is due to falling response rates to the LFS across the whole population (see the Office for National Statistics methodology report for more details).

In the main report we present the averages from a straightforward analysis of the measures split by the different time periods. We conducted further analysis to test whether the patterns in the data remained after controlling separately for seasonality (e.g. changes in well-being through different times in the year, which happen every year and were not specific to 2020). We also test for mode effects, since the LFS data collection methodology changed from a mixture of face-to-face and telephone to full telephone surveying as a result of the pandemic. We used regression analysis to include the controls and conduct the tests. The patterns from the regression outputs were very similar to the raw averages, so for simplicity of reporting we present the simple averages.

Table 3 Sample sizes for LFS/ APS analysis

Year	Sample size of teachers	Sample size of similar professionals
2010/11	4,092	20,358
2011/12	4,153	23,479
2012/13	3,917	23,270
2013/14	4,068	24,633
2014/15	3,847	23,320
2015/16	3,720	22,587
2016/17	3,409	22,705
2017/18	3,368	22,897
2018/19	3,150	22,488
2019/20	3,049	21,567
2019/20 Covid-19 analysis		
1st Sep 2019 – 20th Mar 2020	1,715	12,396
21st Mar 2020 – 15th Jun 2020	709	4,869
16th Jun 2020 – 31st Jul 2020	312	2,218
1st Sep 2020 – 30th Nov 2020	769	5,464
2020 Covid-19 monthly analysis		
January	101	742
February	108	810
March	111	649
April	87	544
May	124	759
June	88	552
July	102	675
August	123	851
September	80	648

Source: Labour Force Survey / Annual Population Survey.

6.2 UKHLS data

We conduct the UKHLS analysis using academic years, which we define using interview dates. The data is collected in overlapping waves, which last just over two years. The analysis therefore cuts across the wave structure of the study design. We analyse all currently available data, which is from waves 1-10. An implication of this for the analysis is that estimates for 2018/19 are provisional, pending further data that was collected early in wave 11. The full set of wave 11 data will be available in November 2021. We also use the 2020 series of UKHLS Covid-19 surveys.

We use cross-sectional analysis weights provided as part of the UK Data Service extract. This ensures the analysis is representative of UK households, and therefore by extension, of English teachers in the state-sector.

The sample sizes used in the UKHLS analysis are shown in Table 4. Sample sizes for each individual measure will differ slightly, depending on the extent of missing data for each measure and the sample used for analysis (e.g. full-time only will have a smaller sample size). The sample sizes in both groups have fallen over time due to longitudinal attrition, while the estimates for 2018/19 have a lower sample size as they do not yet include data from wave 11, and are therefore provisional. The sample sizes for the 2020 Covid-19 surveys are lower still, because of lower overall response rates to these ad-hoc additional surveys.

Table 4 Sample sizes for UKHLS analysis

Year	Sample size of teachers	Sample size of similar professionals
2010/11	650	2,040
2011/12	601	1,809
2012/13	573	1,810
2013/14	520	1,670
2014/15	527	1,611
2015/16	525	1,836
2016/17	454	1,588
2017/18	409	1,501
2018/19	331	973
Covid-19 survey analysis		
April 2020	222	685
May 2020	199	580
June 2020	180	556
July 2020	176	538
September 2020	164	502
November 2020	150	470

Note: Estimates for 2018/19 are provisional: they are based on reduced sample sizes, which will be enhanced with data from wave 11 published in November 2021.

Source: UK Household Longitudinal Study.

7 Teacher well-being and working conditions measures

General Health Questionnaire-12 subjective distress

Source: UKHLS Mainstage waves 1-10 and Covid-19 surveys. The measure converts valid answers to 12 questions of the General Health Questionnaire (GHQ) to a single scale and then summing, giving a scale running from 0 (the least distressed) to 36 (the most distressed). For more information see: https://www.understandingsociety.ac.uk/documentation/mainstage/dataset-documentation/variable/scghq1_dv

Anxiety

Source: APS. Average (mean) response to 'Overall, how anxious did you feel yesterday?' on a scale of 0 "not at all" to 10 "completely".

Life satisfaction

Source: APS. Average (mean) response to 'Overall, how satisfied are you with your life nowadays?' on a scale of 0 "not at all" to 10 "completely".

Happiness

Source: APS. Average (mean) response to 'Overall, how satisfied are you with your life nowadays?' on a scale of 0 "not at all" to 10 "completely".

Feeling that the things you do in your life are worthwhile

Source: APS. Average (mean) response to 'Overall, to what extent do you feel the things you do in your life are worthwhile?' on a scale of 0 "not at all" to 10 "completely".

Perceived job security

Source: UKHLS Covid-19 surveys. Average (mean) response to 'On a scale of 0-100% how likely do you think it is that you will lose your job or shut your business in the next three months?'.

Full-time working hours in the reference week

Source: LFS. Average (mean) response to 'Thinking now about the seven days ending Sunday the [last week], how many hours did you actually work in your (main) job/business – please exclude meal breaks?' Only includes respondents who reported being scheduled to work on every day from Monday-Friday in the reference week and did not have any days off in the reference week due to being sick/injured.

Proportion full-time wanting to work fewer hours

Source: LFS. The measure is derived from a combination of responses and routed questions - see LFS user guide for details. Proportion of respondents: 'Would you rather work shorter hours than in your present job?' Full-time teachers and similar professionals only.

Median full-time annual gross salary (2018/19 prices)

Source: LFS. Survey question: 'What would be your usual gross pay for the last [period]?' Gross weekly pay is a derived variable - see LFS user guidance for how this is constructed. We multiply

by 52.1 to derive annual gross pay. Pay has been inflated to January 2020 prices using the quarterly consumer prices index. Full-time teachers and similar professionals only.

Proportion with low life satisfaction

Source: UKHLS. Proportion of respondents who selected 1 (Completely dissatisfied), 2 (Mostly dissatisfied) or 3 (Somewhat dissatisfied): 'On a scale of 1 to 7 where 1 = 'Completely Dissatisfied' and 7 = 'Completely Satisfied', please tell me the number which you feel best describes how dissatisfied or satisfied you are with the following aspects of your current situation: your life overall'.

Proportion living comfortably/ doing alright financially

Source: UKHLS Mainstage waves 1-10 and Covid-19 surveys. Proportion of respondents who selected 1 (Living comfortably), 2 (Doing alright): 'How well would you say you yourself are managing financially these days? Would you say you are… [Living comfortably/ Doing alright/ Just about getting by/ Finding it quite difficult/ Finding it very difficult]'.

8 References

Hainmueller, J. (2012). 'Entropy balancing for causal effects*:* A multivariate reweighting method to produce balanced samples in observational studies'. *Political Analysis*, **20**, 25-46 [online]. DOI 10.2139/ssrn.1904869.

NFER
National Foundation for Educational Research

Evidence for excellence in education

Public

The Mere, Upton Park, Slough, Berks SL1 2DQ
T: +44 (0)1753 574123 • **F:** +44 (0)1753 691632 • enquiries@nfer.ac.uk

www.nfer.ac.uk

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